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2024

ANNUAL REPORT

RESEARCH,
EDUCATION,
AND OUTREACH



THE CENTER FOR
HUMAN-CARNIVORE COEXISTENCE

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The Center for Human-Carnivore Coexistence (CHCC), an institution housed at Colorado State University (CSU), is focused on integrating transformative science, education, and outreach to minimize conflict and facilitate coexistence between people and carnivores. This annual report summarizes our research, education, and outreach activities during 2024.



THE CENTER FOR
HUMAN-CARNIVORE COEXISTENCE

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CHCC TEAM

TEAM GROWTH

- Dr. Veronica Yovovich, an Assistant Professor and Extension Specialist in the Department of Fish, Wildlife, and Conservation Biology (FWCB), officially joined the CHCC Leadership Team.
- The CHCC added 5 faculty members and 3 Associates in 2024.
- In total, 26 CSU faculty members across multiple departments and colleges were members of the CHCC in 2024.

CHCC LEADERSHIP TEAM

- **Director:** Kevin Crooks, Professor, FWCB; carnivore ecology
- **Co-Director:** Jonathan Salerno, Associate Professor, Department of Human Dimensions of Natural Resources (HDNR); human ecology
- **Co-Director:** Mireille Gonzalez; Research Associate, Center for Human-Carnivore Coexistence; social psychology
- **Leadership Team:** Stewart Breck; Research Wildlife Biologist, USDA Wildlife Services; Faculty Affiliate, FWCB; carnivore ecology
- **Leadership Team:** Veronica Yovovich; Assistant Professor, FWCB; CSU Extension; wildlife conservation biology

CHCC FACULTY TEAM

- **Larissa Bailey:** Professor, FWCB; wildlife conservation biology
- **Meena Balgopal:** Professor, Department of Biology; science education
- **Joel Berger:** Barbara Cox Anthony University Chair in Wildlife Conservation, FWCB; wildlife conservation biology
- **Sara Bombaci:** Assistant Professor, FWCB; wildlife conservation biology
- **Angela Bosco-Lauth:** Assistant Professor, Department of Biomedical Sciences; veterinary and biomedical science
- **Paul Evangelista:** Senior Research Scientist, Natural Resource Ecology Laboratory; landscape ecology
- **Eduardo Gallo Cajiao:** Assistant Professor, HDNR; environmental governance
- **Brian Gerber:** Assistant Unit Leader, Colorado Cooperative Fish and Wildlife Research Unit, FWCB; wildlife ecology
- **Dana Hoag:** Professor, Department of Agricultural and Resource Economics; agricultural economics
- **Rick Knight:** Emeritus Professor, HDNR; wildlife conservation biology
- **Mike Manfredi:** Department Head and Professor, HDNR; conservation psychology
- **Rebecca Niemiec:** Assistant Professor, HDNR; conservation psychology
- **Barry Noon:** Emeritus Professor, FWCB; wildlife conservation biology
- **Courtney Schultz:** Associate Professor, Department of Forest and Rangeland Stewardship; political science
- **Ken Shockley:** Professor and Chair, Department of Philosophy, Holmes Rolston III Chair in Environmental Ethics and Philosophy; environmental philosophy
- **Tara Teel:** Professor, HDNR; conservation psychology
- **Georgia Titcomb:** FWCB; wildlife disease ecologist
- **George Wittemyer:** Professor, FWCB; wildlife conservation biology
- **Barb Wolfe:** Associate Professor, Department of Clinical Sciences; veterinary science
- **Robin Young:** Archuleta County Director/Agriculture and Natural Resources Extension Specialist, CSU Extension
- **Jill Zarestky:** Associate Professor, School of Education; adult education





CHCC POSTDOCTORAL FELLOWS AND RESEARCHERS

- **Heather Abernathy:** CHCC Postdoctoral Fellow. FWCB, advised by G. Wittemyer and M. Ditmer. Quantifying human recreation patterns across the American West and assessing its impact on human-wildlife conflict.
- **Treana Mayer:** CHCC Postdoctoral Fellow. Microbiology, Immunology, Pathology, advised by S. VandeWoude. Emerging zoonotic disease at the wildlife-public interface; Echinococcosis in canids and people; spillover risk of Highly Pathogenic Avian Influenza.
- **Redae Tesfai:** CHCC Research Associate. Natural Resource Ecology Lab, advised by P. Evangelista. Combating illegal cheetah trafficking for the pet trade.
- **Patricia Tricorache:** CHCC Research Assistant. Natural Resource Ecology Lab, advised by P. Evangelista. Combating illegal cheetah trafficking for the pet trade.
- **Rekha Warrior:** CHCC Postdoctoral Fellow. HDNR, advised by J. Salerno. Interactions among agropastoral households and their environment and the implications for large carnivore conservation in Tanzania.

- **Santiago Chiquito:** CHCC Associate. Director, Neotropical Innovation. Protection-production systems for nature coexistence.
- **Barbara De Mori:** CHCC Associate. Professor, Director, Ethics Laboratory for Veterinary Medicine, Conservation and Animal Welfare. Padua University, Italy. Wildlife and conservation ethics.
- **Nishith Dharaiya:** CHCC Associate. Director, Associate Professor, HNG University, Patan, India; Founder, WSB Research Foundation; Registrar, Center of Excellence for Wildlife and Conservation Studies. Carnivore conflict and coexistence in India.
- **Angélica Diaz:** CHCC Associate, Director. Neotropical Innovation. Community engagement and conservation technology in Colombia.
- **Mark Ditmer:** CHCC Associate. USFS Research Ecologist, Rocky Mountain Research Station, USFS. Spatial modeling of carnivore habitat suitability and conflict hotspots.
- **Anthony J. Giordano:** CHCC Associate. Chief Conservation Science Officer, S.P.E.C.I.E.S. International carnivore conservation practice and research.
- **Seth Wilson:** CHCC Associate. Executive Director, Blackfoot Challenge. Applied practitioner focused on human-carnivore coexistence.



SOCIAL AND ECOLOGICAL RESEARCH

Conflict between humans and carnivores results from the interaction between people and carnivores. Consequently, solutions to conflict require effective integration of both social and ecological science. A primary goal of the CHCC is to conduct social and ecological research to understand how and where humans and carnivores can coexist and to develop approaches to reduce conflict. We have developed research projects in a variety of systems where coexistence is proving difficult and there is substantial need for interdisciplinary, collaborative efforts to reduce conflict.

RESEARCH PROJECT HIGHLIGHTS

- Rancher sustainability in landscapes with predators, including wolves and grizzly bears in the western U.S. and jaguars and pumas in Colombia
- Evaluation of range riding to prevent livestock losses to wolves in Washington State
- Understanding the role of night-penning livestock for predation reduction
- Documenting grizzly bear interaction with livestock in southwestern Montana
- Wolf and wolverine restoration in Colorado
- Human-black bear coexistence in urban areas in the Western US
- Community-based land stewardship and carnivore conservation in Guatemala
- Sloth bear and leopard conflict in India
- Conflict between carnivores and livestock keepers in East Africa
- Tourism impacts on carnivore-prey interactions in South African food webs
- Combating illegal cheetah trafficking in the Eastern Horn of Africa
- Impacts of scavengers on spread of Chronic Wasting Disease
- Public perceptions of conflict with wolves in urban areas in Italy
- Public perceptions of hunting black bears and mountain lions in Colorado
- Co-producing a coexistence and conservation plan for jaguar, puma, hoary foxes, and maned wolves in Brazil
- Studies on the nature of environmental harm



31 SCIENTIFIC PUBLICATIONS

CHCC researchers published a total of 31 scientific publications on carnivores and coexistence in 2024.

Bardales, R., Boron, V., Viana Passos, D. F., Sousa, L. L., Droge, E., Jaramillo, M., Payan, E., Sillero-Zubiri, C., & Hyde, M. (2024). Neotropical mammal responses to megafires in the Brazilian Pantanal. *Global Change Biology*, 30(4).

Benson, J. F., Keiter, D. A., Mahoney, P. J., Allen, B. L., Allen, L., Álvares, F., ... & Patterson, B. R. (2024). Intrinsic and environmental drivers of pairwise cohesion in wild *Canis* social groups. *Ecology*, e4492.

Berger, J. & Kusi, N. (2024). Meeting your ancestors—Sticks, stones, and discord in Earth's outposts. *Global Ecology and Conservation*, 52, e02959.

Berger, J. (2024). Listening to Learn – Nature's Hot and Cold Extremes. In B. Minteer & J. Losos (Eds.), *The Heart of the Wild* (1st ed., pp. 191-204). Princeton University Press.

Berger, J., Bleich, V. C., & Bowyer, R. T. (2024). Must we lose our biological connection to nature to endure changing times? *Journal of Wildlife Management*, 88, e22639.

Berger, J. and Cassidy, K.A. (2024). Play is a privilege in both humans and animals: how our recreation influences wildlife. *The Journal of Wildlife Management*, 88(8), e22664.

Burton, A. C., Beirne, C., Gaynor, K. M., Sun, C., Granados, A., et al. [incl. A. J. Giordano & B. Gerber]. (2024). Mammal responses to global changes in human activity vary with trophic group and landscape. *Nature Ecology & Evolution*, 8, 924–935.

Conlon, M. M., Balgopal, M. M., Bruyere, B. L., Wright, D. S., Crooks, K. R., & Salerno, J. (2024). Who teaches place-based education: identifying relationships between environmental value orientation and pedagogical values. *Environmental Education Research*, 1-16.

Esparza, J. M., Concone, H. V. B., Giordano, A. J. & Hertel, F. (2024). Niche segregation between two armadillo species in the southern Pantanal of Brazil. *Mastozoologia Neotropical*.

Evangelista, P. H., Young, N. E., Schulte, D. K., Tricorache, P. D., Luizza, M. W., Durant, S. M., Jones, K. W., Mitchell, N., Maule, T., Ali, A. H., Tesfai, R.T. & Engelstad, P. S. (2024). Mapping illegal trade routes of live cheetah (*Acinonyx jubatus*) from the Horn of Africa to the Arabian Peninsula. *Conservation Biology*, e14412.

Fisk, J., Leong, K., Berl, R. E. W., Long, J., Adams, M., Hankins, D., Lake, F., Landon, A., Williams, C., & Salerno, J. (2024). Evolving wildlife management cultures of governance through Indigenous Knowledges and perspectives. *Journal of Wildlife Management*, 88(6).

Gagorik, C. N., Theimer, T. C., Crooks, K. R. & Boser, C. L. (2024). Space use and den visitation by the island spotted skunk (*Spilogale gracilis amphiala*) and island fox (*Urocyon littoralis*). *The Southwestern Naturalist*, 68(1), pp.35-46.

Gerber, B. D., Devarajan, K., Farris, Z. J., & Fidino, M. (2024). A model-based hypothesis framework to define and estimate the diel niche via the 'Diel Niche' R package. *Journal of Animal Ecology*, 93, 132–146. <https://doi.org/10.1111/1365-2656.14035>

Ghasemi, B., Niemiec, R., & Crooks, K. R. (2024). Public perspectives on hunting mountain lions and black bears in Colorado. *Conservation Science and Practice*, e13213.

Gonzalez, M. N., Berl, R.E.W., Teel, T., & Niemiec, R. M. (2024). The impact of normative beliefs on intended voting and collective actions related to wolf reintroduction. *Society and Natural Resources*, 37(8), 1160–1176. 10.1080/08941920.2024.2335400

Gonzalez, M. N., Heid, T., & Niemiec, R. M. (2024). Characterizing social conflict over wolf reintroduction in Colorado: A theoretical model of intergroup conflict. *People and Nature*, 6(5), 2001-2013.

Guerisoli, M., Bauer, G., Giordano, A. J., & Schiaffini, M. (2024). Cats at the end of the world: Enhancing the knowledge of the smallest felid of the Americas, the enigmatic kodkod in Los Alerces National Park, Patagonia, Argentina. *Wild Felid Monitor*.

Hyde, M., Di Domenico, S., Avellanada, C., Diaz-Pulido, A., Chiquito-García, S., Mejía-González, A. & Breck, S.W. (2024). Andean bears hunt wild guinea pigs in Colombian paramos. *Journal of Tropical Ecology*, 40:e17.

Iannarilli, F., Gerber, B. D., Erb, J., & Fieberg, J. R. (2024). A 'how-to' guide for estimating animal diel activity using hierarchical models. *Journal of Animal Ecology*, 00, 1–13.

Jayaweera, U., Seneviratne, S. & Jayaratne, C. (2024). *The Way of the Jackal*. Edited and Forward by A. J. Giordano. Wildlife and Nature Protection Society of Sri Lanka, Sri Jayawardenepura Kotte, Sri Lanka.

Layden, T. J., Fernández, S., Sandoval-Lemus, M. Sonius, K. J., David-Chavez, D., & Bombaci, S. P. (2024). Shifting power in practice: Implementing relational practice & evaluation in conservation science. *Social Sciences*, 13(10):555.

Malesis, A., Windell, R.M., Vanbianchi, C., & Prugh, L. R. (2024). A scavenger's paradise: Coyotes take advantage of ungulate carrion subsidies as wolves recolonize Washington. *Canadian Journal of Zoology*.

Mayer, A. E., Ganoë, L. S., Brown, C., & Gerber, B. D. (2024). Diel activity structures the occurrence of a mammal community in a human-dominated landscape. *Ecology and Evolution*, 13, e10684.

Nickerson, R., Hoag, D., Evangelista, P. H., Niemiec, R., Few, A. & Breck, S.W. (2024). US livestock producer interest in alternatives to compensation programs for wolf depredation. *Human Dimensions of Wildlife*, 1–16.

Racero-Casarrubia, J., Ortiz-Hoyos, R.D., Hyde, M., & Argel-Fernandez, A., Figel, J.F.X. (2024). Big cat predation on domestic dogs and livestock in and around Paramillo National Natural Park, Colombia. *Biota Colombiana*, 25, 1–11.

Soofi, M., Ghasemi, B., Ahmadpour, M., Soufi, M., Islami, I., Eckert, A., ... & Pavey, C. R. (2024). Application of the integrated threat theory to conservation law enforcement. *Conservation Biology*, e14248.

Twining, J. P., Sutherland, C., Zalewski, A., Cove, M. V., Birks, J., Wearn, O. R., ... & Powell, R. A. (2024). Using global remote camera data of a solitary species complex to evaluate the drivers of group formation. *Proceedings of the National Academy of Sciences*, 121(12), e2312252121.

Vercauteren, K., & Breck, S.W. (2024). Overview of global wildlife-livestock interfaces: The array of conflicts and strategies to mitigate them. *Animal Frontiers*, 14(1), 30–39.

Windell, R.M., Bailey, L., Livieri, T., Eads, D., Biggins, D., & Breck, S. (2024). Coyote use of prairie dog colonies is most frequent in areas used by American badgers. *Journal of Mammalogy*, 105(6), 1309–1321.

Yovovich, V., Serieys, L.K., Pearce, T., Kupar, C., Stratton, A., Bayrakcismith, R., Sager-Fradkin, K., Bergman, D., Ackerman, B., Phillips, K., Jones, G., & Elbroch, L.M. (2024). Wild felid anticoagulant rodenticide exposure in Washington. *Canadian Wildlife Biology & Management*, 13(2).

Zeller, K. A., Ditmer, M. A., Squires, J. R., ... Barber, J. R. (2024). The hidden impacts of outdoor recreation: Experimental recreationist noise alters behavior and space use of wildlife. *Current Biology*, 34(13), 2997 – 3004.e3.





SCIENTIFIC PRESENTATIONS

CHCC researchers presented multiple scientific presentations in 2024. Examples include:

JANUARY: Camara, C. (2024, January). *Communicating for coexistence: Large carnivore conservation communication workshop*. Helsinki, Finland.

FEBRUARY: Crooks, K. (2024, February). *Social-ecological insights into Colorado wolf restoration*. Colorado Chapter of The Wildlife Society, Pueblo, CO.

FEBRUARY: Gerber, B.D. (2024, February). *Modern animal diel ecology*. Norwegian University of Life Sciences, As, Norway.

FEBRUARY: Giordano, A. (2024, February). *The use of conservation technology and innovation in addressing threats to biodiversity, including in the resolution of human-carnivore conflict*. Virtual Summit for World Wildlife Day.

FEBRUARY: Giordano, A. (2024, February). *SPECIES' clouded leopard conservation efforts*. Webinar, AZA Clouded Leopard SSP and the EAZA Clouded Leopard EEP.

FEBRUARY: Gonzalez, M. (2024, February). *Characterizing the social conflict about wolf restoration in Colorado: A theoretical model of intergroup contact*. Colorado Chapter of The Wildlife Society, Pueblo, CO.

MARCH: Shockley, K. (2024, March). *Shared vulnerability and common adaptation: Environmental vulnerability and the interdependence of ecological systems and human communities*. Keynote at the inaugural meetings of the Southern African Society of Environmental Philosophy (SASEP), Skukuza Camp, Kruger National Park, South Africa.

MAY: Venumière-Lefebvre, C. (2024, May). *Bears, watch your step: A study of fine-scale individual bear movement through an urban landscape in Colorado*. 14th Western Black Bear Workshop, Jackson Hole, WY.

MAY: Abernathy, H. (2024, May). *Dynamic human presence in predator-prey interactions: Leveraging GPS smartphone data to assess competing risks*. American Society of Mammalogists, Boulder, CO.

MAY: Ditmer, M.. (2024, May). *Recreation noise alters wildlife behavior and site use*. American Society of Mammalogists, Boulder, CO.

MAY: Ditmer, M. (2024, June). *Reintroducing an apex predator via ballot initiative: Challenges and opportunities for the return of the gray wolf to Colorado*. North American Congress for Conservation Biology, Vancouver, British Columbia.

JUNE: Giordano, A.J. (2024, June). *Jaguar ecology and conflict prevention*. Zoo & Aquariums Conservation Conference, Salt Lake City, UT.

JUNE: Giordano, A.J. (2024, June). *Mechanisms for building tolerance for predators in developing countries and tropical geographies, including Borneo, Sri Lanka, and Nepal*. Zoo & Aquariums Conservation Conference, Salt Lake City, UT.

JUNE: Windell R.M. (2024, June). *Coyote use of prairie dog colonies is most frequent in areas used by American badgers*. American Society of Mammalogists Conference, Boulder, CO.

SEPTEMBER: Mayer, T., Bevins, S., & VandeWoude, S. (2024, September). *Spatial correlation of feline H5N1 spillover with wild bird or agricultural sources of avian influenza in the US, 2021-2024*. Rocky Mountain Virology Association annual meeting, CSU Colorado Mountain Campus, CO.

SEPTEMBER: Ferreira, B., Cavalcanti de Azevedo, F., Gemesio Lemos, F., Gonzalez, M., Pasa, J., Pinho, M. & Tedoro, S. (2024, September). *Who should be on the discussion table? Stakeholder Analysis to co-create a Collaborative Action Plan for Human-Carnivore Coexistence*. Brazilian Mammal Congress, Curitiba, Brazil.

SEPTEMBER: Venumière-Lefebvre, C. (2024, September). *Bears, watch your step: A study of fine-scale individual bear movement through an urban landscape in Colorado*. 28th International Association for Bear Research and Management, Edmonton, Alberta, Canada.

OCTOBER: Camara, C. (2024, October). *What makes Gen Z howl? Exploring conservation and coexistence*. Pathways Europe: Human Dimensions of Wildlife Conference, Córdoba, Spain.

OCTOBER: Crooks, K. (2024, October). *Social-ecological insights in Colorado wolf reintroduction*. Pathways Europe: Human Dimensions of Wildlife Conference, Córdoba, Spain.

OCTOBER: Gonzalez, M. (2024, October). *Characterizing the conflict over wolf reintroduction in Colorado: A theoretical model of intergroup conflict*. Pathways Europe: Human Dimensions of Wildlife Conference, Córdoba, Spain.

OCTOBER: Gonzalez, M. (2024, October). *A theoretical model of intergroup conflict: Pathways to pursue reconciliation*. The International Wildlife Coexistence Conference, Turin, Italy.

OCTOBER: Hyde, M. (2024, October). *Human-carnivore conflict mitigation on ranchlands in the Western United States and Eastern Colombia*. Department of Fish, Wildlife, and Conservation Biology, CSU, Fort Collins, CO.

OCTOBER: Hyde, M. (2024, October). *Jaguar tolerance and retaliation in Eastern Colombia*. The Wildlife Society, Baltimore, MD.

OCTOBER: Hyde, M. (2024, November). *Non-lethal mitigation of wolf damage to livestock production. Wolf-livestock damage prevention*. Puebla de Sanabria, Zamora, Spain.

NOVEMBER: Purdy, C. (2024, November). *Social-Ecological Systems Reflection on Human-Wildlife Conflict and Coexistence: A Two Case Study Approach*. Department of Human Dimensions of Natural Resources, CSU, Fort Collins, CO.

DECEMBER: Venumière-Lefebvre, C., Breck, S., Johnson, H., Alldredge, M. & Crooks, K. (2024, December). *Bears, watch your step: fine-scale individual bear movements in Durango*. Graduate Student Showcase, CSU, Fort Collins, CO.

\$ 2024 FUNDING BY THE NUMBERS



\$4,890,336

**TOTAL ONGOING CHCC FUNDING
ADMINISTERED THROUGH CSU**



\$4,118,680

EXTERNAL GIFTS & GRANTS



\$771,656

INTERNAL CSU FUNDS



\$8,303,591

**TOTAL ONGOING FUNDING FOR
CHCC AND PARTNERS**

EXTERNAL GIFTS: \$1,748,160 (ongoing in 2024)

Private Donor: *Philanthropic gift to the Center for Human-Carnivore Coexistence*. \$1,000,000. PI K. Crooks (2021-2026).

Donald Slavik Family Foundation: *Fighting illegal trafficking of cheetahs in Somaliland through strategic capacity building in the classroom, field, and courts of law*. \$100,000. PI P. Evangelista (2022-2024).

Greater Yellowstone Coalition: *Interactions between grizzly bears and livestock: A pilot effort to enhance understanding with noninvasive methods*. \$4,800. PIs S. Breck, M. Hyde, (2023-2024).

Lordi Foundation: *Improving the reproductive success in the ferret using new minimally invasive assisted reproductive techniques*. \$500,000 PIs B. Wolfe, F. Hollinshead (2023-2028).

Riverstyx Foundation: *Automated Mineral Bin (ABM) development for reducing predator-livestock conflict*. \$50,000. PIs C. Krebs, S. Breck (2023-2024).

Riverstyx Foundation: *Effective messaging and community engagement for carnivore coexistence: Wolf restoration in Colorado*. \$50,000. PI C. Camara (2022-2025).

Various Donors: *CSU Wolf Conflict Reduction Fund*: \$22,360. PI K. Crooks (2022-2024).

Various Donors: *Colorado Conflict Reduction Group*: \$14,000. PI M. Gonzalez (2024-2025).

Wild Felid Association. *Impacts of bobcat and mountain lion presence on Canada Lynx in Colorado*. \$2,000. PI: M. Hertel (2024).

Y Cross Ranch Scholarship. *Colorado rancher perspectives on livestock protection approaches*. \$5,000. PIs: J. Brager, V. Yovovich (2024).

EXTERNAL GRANTS: \$2,370,520 (ongoing in 2024)

NSF Human-Environment and Geographical Sciences: *Adaptive human migration in changing environments: Leveraging geographic sciences to advance new models of migration decision-making*. \$399,940. PI: J. Salerno. Co-PIs: R. Boone, A. Gaughan, L. Hunter, J. Hartter (2021-2024).

USDA National Wildlife Research Center Cooperative Agreement: *Non-lethal tool development and evaluation for predator management*. \$110,000. PIs K. Crooks, S. Breck (2023-2025).

U.S. Fish and Wildlife Service. *Combating illegal cheetah trafficking: An adaptive management strategy for building regional and national capacity in the Horn of Africa*. \$1,000,000. PI: P. Evangelista (2022-2025).

USFS Rocky Mountain Research Station. *Evaluating wildlife responses to recreation and other anthropogenic disturbances using novel data streams*. \$540,000. PIs: G. Wittemyer, M. Ditmer (2022-2025).

U.S. National Park Service: *Assessing fisher response and habitat use in relation to landscape change and human disturbance*. \$35,000. PIs: G. Wittemyer, M. Ditmer (2024-2025).

Washington State University. *An assessment of the wolf-livestock management program in NE Washington*. \$185,587. PIs: M. Gonzalez, S. Wilson, K. Crooks, S. Breck, J. Young (2024).

Western Extension Risk Management Education Center. *Risks and risk management for wolf-livestock conflicts in the West*. \$99,993. PIs: D. Hoag, R. Young, V. Yovovich, S. Breck (2024-2025).

These funds will advance our human-carnivore coexistence research, education, and outreach efforts. Funding sources have included a mixture of gifts from private foundations and donors, external grants from governmental agencies and non-governmental organizations, and internal CSU funds.

INTERNAL CSU FUNDS: \$771,656 (ongoing in 2024)

CSU 50% match to \$1M philanthropic gift: CSU Provost; Office of Vice President for Research; Warner College of Natural Resources; Department of Fish, Wildlife, and Conservation Biology; One Health Institute. \$500,000. PI: K. Crooks (2021–2026).

CSU Extension Summer Internship Program. *Ranch efficiency and livestock protection methods: Summer internship program*. \$14,000. PIs: V. Yovovich, R. Young, M. Gonzalez, F. Garry, J. Ritten, H.C. Kersting, B. Osborn (2024).

Center for Collaborative Conservation Fellowship Grants. *Colorado ranchers' perspectives on proactive livestock protection tools to minimize wolf-livestock conflict*. \$15,640. PIs: J. Brager, V. Yovovich, M. Gonzalez (2024–2025).

Center for Collaborative Conservation Fellowship Grants. *Co-producing a coexistence plan for puma, jaguar, hoary foxes, & maned wolves with local communities in Goias, Brazil*. \$16,016. PIs: B. Ferreira, F. Gemesio Lemos, F. Cavalcanti de Azevedo, M. Gonzalez (2024–2025).

Dean's Fund for Transdisciplinary Approaches to Solve Environmental Wicked Problems. *A One Health transdisciplinary approach to human-wildlife coexistence*. \$49,000. PIs: K. Crooks, J. Salerno (2023–2024).

WCNR Hatch Competitive Grants Program. *Impacts of livestock-carnivore conflict mitigation tools on rangeland ecology and management*. \$175,500. PI: V. Yovovich (2023–2026).

WCNR Award Graduate Student Achievement. *Bears, watch your step: Fine-scale individual bear movements in Durango*. CSU Graduate Student Showcase. \$500. PI: C. Venumière-Lefebvre (2024).

WCNR Robert and Dorothy Udall Scholarship. \$1,000. PI: C. Venumière-Lefebvre (2024).

COLLABORATORS, ADMINISTERED OUTSIDE CSU: \$3,413,255 (ongoing in 2024)

Parex: Expedición Tigre Pinta Menuda: *Promoting jaguar conservation and tourism in the Colombian Llanos*. \$65,000. PI: M. Hyde; Collaborator: Fundación Cunaguaro; administered external to CSU (2023–2024).

Richard King Mellon Foundation: *Bay Area, California Carnivore-Livestock Interactions Project*. \$100,000. PI: V. Yovovich; Collaborator: Panthera; administered external to CSU (2024).

The Karis Foundation. *Testing theoretical behavior change approaches in environmental education campaigns for wolverine reintroduction in Colorado*. \$10,000. PIs: K. Schneider, M. Gonzalez; Collaborator: Defenders of Wildlife; administered external to CSU (2024–2025).

USDA-NRCS Regional Conservation Partnership Program (RCPP): *Stewarding the working wild in MT, OR, and CO: Non-lethal predator risk management on agricultural operations*. \$2,000,000. Collaborators: Heart of the Rockies, Western Landowners Alliance; administered external to CSU (2024–2029).

USDA NRCS Conservation Innovation Grant (CIG): *Landowner collaborative strategies for nonlethal predator control*. \$888,255. PI: S. Breck; Collaborators: USDA, Western Landowners Alliance; administered external to CSU (2020–2024).

USDA Western Sustainable Agriculture Research and Education (SARE): *Landowner collaborative strategies for nonlethal predator control*. \$350,000. PI: S. Breck; Collaborators: Montana State University, Utah State University, Western Landowners Alliance; administered external to CSU (2022–2024).



STUDENT EDUCATION AND MENTORING

A key goal of the CHCC is educating and mentoring future leaders in the field of human-carnivore coexistence, including graduate students and undergraduate students from the U.S. and abroad.

GRADUATE STUDENT MENTORING

The CHCC added 5 new graduate students in 2024. In total, 16 graduate students were members of the CHCC in 2024.

GRADUATE STUDENTS

- **Jenna Brager:** MS in Conservation Leadership, HDNR, advised by V. Yovovich and M. Gonzalez. Rancher perceptions of livestock protection and conflict mitigation tools.
- **Cassi Camara:** PhD Student, HDNR, advised by E. Gallo Cajiao. Analysis of outreach and messaging strategies regarding wolf reintroduction in Colorado.
- **Tim Helming:** MS in Conservation Leadership, HDNR, advised by B. Bruyere and M. Gonzalez. Analyzing the collaborative process regarding wolf restoration to Colorado.
- **Tom Hilton:** PhD Student, HDNR, advised by J. Salerno. Systems impacts of human-wildlife interactions - modeling multilevel economies from households to nation states.
- **Morgan Rae Hertel:** PhD Student, FWCB, advised by V. Yovovich. Livestock behavioral responses to predation deterrents and potential implications for rangeland ecology.
- **Matt Hyde:** PhD Student, GDPE, advised by S. Breck and K. Crooks. Using non-lethal tools to reduce conflict between ranchers and predators in Colombia and the Rocky Mountain West.
- **Tamara Layden:** PhD Student, GDPE, advised by S. Bombaci. The role of community-based land stewardship in shaping carnivore conservation in the tropics of Guatemala.
- **Trent Pearce:** MS Student, FWCB, advised by S. Bombaci. Social mediacommunication about wolf reintroduction in Colorado.
- **Cole Purdy:** Masters in Conservation Leadership, HDNR, advised by M. Gonzalez. Influencers of trust and social conflict related to wolf restoration and management in Colorado and multispecies occupancy of anteaters and domestic dogs in Colombia.
- **Jaime Raupp:** MS Student, FWCB, advised by V. Yovovich. Carnivore and wildlife behavioral responses to predation deterrents and potential ecological implications.
- **Kaitlyn Reed:** MS in Conservation Leadership, HDNR, advised by M. Gonzalez. Testing the efficacy of education programming for wolverine reintroduction in Colorado.
- **Kelly Russo:** MS Student, FWCB, advised by G. Wittemyer. Impacts of scavengers on Chronic Wasting Disease spread.
- **Cassandre Venumière-Lefebvre:** PhD Student, FWCB, advised by K. Crooks and S. Breck. Integrating social and ecological science to identify effective strategies for human-bear coexistence.
- **Erin Weingarten:** PhD Student, GDPE, advised by A. Lavoie. Teaching racial equity in conservation higher education.
- **Abigail Whittaker:** PhD Student, HDNR, advised by J. Salerno. Carnivores, human tolerance of conflict, and tolerance transmission in East Africa.
- **Becca Windell:** PhD Student, FWCB, advised by G. Titcomb, L. Bailey, and J. Malmberg. Behavioral responses, transmission hotspots, and disease-predation interactions in Chronic Wasting Disease infected mule deer.

CHCC GRADUATE STUDENT RESEARCH & OUTREACH MINI-GRANT

In March, CHCC announced the recipients of the second annual CHCC Student Research and Outreach Mini-Grants (~\$2,000 each).

- **Jenna Brager:** *Exploring rancher perspectives of livestock protection tools.*
- **Morgan Rae Hertel:** *Cattle responses to fladry and foxlights.*
- **Matt Hyde:** *Promoting an understanding of tolerance for carnivore conflict.*
- **Cole Purdy:** *Multispecies occupancy of anteaters and domestic dogs in Colombia.*
- **Cassandre Venumière-Lefebvre:** *Measuring effectiveness of strategies to reduce human-bear conflict in developed areas.*
- **Becca Windell:** *Human-bear coexistence in the Methow Valley: Community dumpster program research and development.*

CHCC UNDERGRADUATE RESEARCH EXPERIENCE

CHCC accepted the second cohort into the Undergraduate Research Experience (URE) program. The URE aims to provide applied, social-ecological research experiences and skills to undergraduates, while also engaging and supporting CHCC faculty, graduate students, and partners. In addition to their research, URE students participated in the CHCC Fall lab where they received mentoring and research design support.

- **Hannah Bailey:** mentored by S. Breck, J. Salerno. *Developing and employing technological solutions to human-carnivore coexistence.*
- **Emma Burdick:** mentored by S. Breck, C. Venumière-Lefebvre, M. Hyde. *Undergraduate mentorship in applied research to reduce human-carnivore conflict in the Western United States.*
- **Charlie Van Cleave:** mentored by V. Yovovich, M. Gonzalez, J. Brager. *Colorado rancher perceptions on livestock protection tools.*
- **Mary Callaghan:** mentored by J. Brousseau, J. Salerno. *Mapping social networks of carnivore conflict and tolerance.*
- **Aidan Hallsworth:** mentored by S. Breck, M. Hyde, C. Venumière-Lefebvre. *Undergraduate mentorship in applied research to reduce human-carnivore conflict in the Western United States.*
- **Maddie McNeil:** mentored by M. Gonzalez, C. Purdy. *An assessment of the Northeast Washington Wolf-Livestock Management Program.*
- **James Wiske:** mentored by S. Breck, C. Venumière-Lefebvre, M. Hyde. *Undergraduate mentorship in applied research to reduce human-carnivore conflict in the Western United States.*

CHCC INTERNATIONAL GRADUATE FELLOWS PROGRAM

The CHCC International Graduate Fellows Program aims to advance the mission of the CHCC by supporting social-ecological science beyond North American systems in important landscapes for coexistence. The Fellows Program provides small grants to support international graduate students working on coexistence challenges and solutions in their home country.

- **Simone Basile:** PhD student, Padua University, Italy. Advisor: Barbara di Mori. Receiving CHCC mentorship from M. Gonzalez. Exploring ethical perceptions of bold carnivores in urban settings.
- **Pratik Desai:** PhD Student, HNG University, Patan, India. Advisor: Nishith Dharaiya. Receiving CHCC mentorship from S. Breck. Human-sloth bear coexistence in Gujarat, India.
- **Elizabeth Ruiz Elejalde:** MS student, Javeriana University Bogota. Receiving CHCC mentorship from M. Hyde. Community ecology and mammal conservation in the Colombian Llanos.
- **Shweta Shivakumar:** PhD Student, Manipal Academy of Higher Education, Manipal, India. Advisor, Dr. Krithi Karanth; Co-advisor: Dr. Vidya Athreya. Receiving CHCC mentorship from M. Gonzalez. Big cat and human encounters in Himachal Pradesh, India.





TEACHING

CHCC faculty and students also incorporated human-carnivore coexistence topics into their coursework at CSU and other institutions. Examples in 2024 include:

- ▲ **JANUARY - MAY** | Yovovich, V. New semester-long upper division undergraduate course on human-wildlife conflict and coexistence. FW496B Human-Wildlife Conflict Management.
- ▲ **JANUARY - MAY** | Shockley, K. Redesigned graduate seminar. PHI566 Environmental Philosophy: Human Flourishing and the Environment.
- ▲ **JANUARY** | Tricorache, P. Pets and Pelts: The illegal trade of cheetah. Guest lecture, Jigjiga University, Ethiopia.
- ▲ **FEBRUARY** | Breck, S. The role of educational tools in solving human-wildlife conflict and coexistence issues. Guest Lecture, FW496B Human-Wildlife Conflict Management
- ▲ **FEBRUARY** | Crooks, K. Socio-ecological scientific insights into Colorado wolf restoration. Guest lecture, FW472 Issues in Animal Conservation and Management.
- ▲ **MARCH** | Crooks, K. & Gonzalez, M. Social and ecological factors related to wolf reintroduction in Colorado. Guest Lecture, CSU Osher Lifelong Learning Institute.
- ▲ **MARCH** | Crooks, K. Wolf reintroduction in Colorado. Guest Lecture, FW260 Principles of Wildlife Management.
- ▲ **APRIL** | Crooks, K. Wolf reintroduction in Colorado. Guest Lecture, FW375 Field Wildlife Studies.
- ▲ **APRIL** | Gonzalez, M. The human dimensions of wildlife management. Guest Lecture, FW496B Human-Wildlife Conflict.
- ▲ **APRIL** | Gonzalez, M. Social science research on wolf reintroduction in Colorado. Guest Lecture. FW496B Human-Wildlife Conflict.
- ▲ **AUGUST - DECEMBER** | Gonzalez, M. CHCC Undergraduate Research Experience Fall Lab.
- ▲ **AUGUST** | Salerno, J. Human-lion conflicts and the social transmission of tolerance. Guest Lecture, NRRT 262 Conservation Conflict.
- ▲ **AUGUST** | Salerno, J. The Center for Human-Carnivore Coexistence. Guest Lecture, FW 696 Introduction to Fish, Wildlife, and Conservation Biology.
- ▲ **NOVEMBER** | Bombaci, S. The impacts of human-wildlife conflict for marginalized communities and developing nations. Module and GIS lab in FW310 Mapping Diverse Perspectives in Conservation.



OUTREACH AND ENGAGEMENT

A primary goal for the CHCC is to transform social and ecological science to real-world action to facilitate coexistence and minimize conflict around carnivores, including direct conflict between carnivores and people and social conflict among people about carnivores. Ultimately, through our outreach and engagement we strive to reduce impacts to both people and predators.

2024 HIGHLIGHT TIMELINE: OUTREACH AND ENGAGEMENT EFFORTS

JANUARY-DECEMBER |

The CHCC continued administration of the Wolf Conflict Reduction Fund through the CSU Foundation. Donations to the fund support efforts of CSU and partners to implement on-the-ground, non-lethal tools to prevent livestock losses to wolves in Colorado.

JANUARY | C. Camara designed and facilitated a three-day workshop for communication teams at the Finnish Wildlife Agency, the Finnish Ministry of Agriculture and Forestry, and the European Union Life Project: Boreal Wolf. The workshop focused on strategies for communicating large carnivore conservation efforts through a multi-faceted approach.

FEBRUARY | M. Hyde visited Casanare, Colombia to share results from his PhD research on tolerance of jaguars in Colombian ranchlands. Attendees included Panthera Colombia and three local communities where data were collected.

APRIL | The CHCC, in collaboration with the Center for Collaborative Conservation, hosted a panel discussion, titled "People and predator perspectives: Navigating coexistence across cultures," for a general public audience in Fort Collins. J. Salerno moderated and panelists included CHCC members S. Breck, J. Brager, V. Yovovich and collaborators from Mongolia and Brazil.

JANUARY-DECEMBER | The CHCC continued to lead the Colorado Conflict Reduction Group. This is a collaborative working group of key stakeholders involved in reducing conflict with wolves in Colorado, including individuals from academia, state and federal wildlife management agencies, environmental NGOs, and ranching representatives.

FEBRUARY | P. Evangelista, R. Tesfai, and P. Tricorache conducted wildlife crime and law enforcement training workshops in Jigjiga, Ethiopia. The training, funded by the Donald Slavik Family Foundation, is part of a regional strategy to combat illegal trafficking of cheetah and other wildlife being smuggled through Ethiopia, Somaliland, and into the Arab Peninsula.

APRIL | The CHCC co-hosted a panel discussion with Defenders of Wildlife at CSU entitled "Finding common ground between ranching and wolf restoration." Panelists include M. Gonzalez (CHCC), K. Schnieder (Defenders of Wildlife), A. Baca (Colorado Parks and Wildlife), M. Ensley (Working Circle), and J. Stanko (Colorado Rancher).

SEPTEMBER-DECEMBER |

V. Yovovich, in collaboration with CSU Extension, Colorado Parks and Wildlife, Colorado Department of Agriculture, and USDA Wildlife Services, helped develop a traveling program to assist ranchers in reducing livestock losses to carnivores in Colorado. The group has hosted meetings for ranchers in eight counties across Northern and Northwestern Colorado to date.

OCTOBER | K. Shockley served as Host, Moderator, and Commentator for a CSU panel discussion entitled "People, land, and animals: The keys to conservation that work" in honor of the 75th anniversary of Aldo Leopold's *A Sand County Almanac*.

MAY | The CHCC led a workshop for the Colorado Conflict Reduction Group at the CSU SPUR campus in Denver, facilitated by M. Gonzalez. The workshop focused on developing strategies for promoting proactive approaches to reduce conflict with wolves in Colorado.

APRIL | The CHCC, supported by the One Health Institute and the WCNR Dean's Transdisciplinary Award, hosted the Handprint Challenge Competition Event, where cross-college teams of undergraduate students competed to propose real-world solutions to human-carnivore coexistence in agricultural landscapes. At the competition, six finalist teams presented their projects in a "Shark Tank" style presentation to an interdisciplinary panel of expert judges. Student teams represented seven different colleges across CSU, and winning teams received cash prizes.

JUNE-DECEMBER | S. Breck and K. Crooks served as members of the Colorado Parks and Wildlife Human-Bear Conflict Working Group. The purpose of the group is to facilitate statewide collaboration and coordination to reduce conflict between black bears and people in urban areas in Colorado.

SEPTEMBER | The CHCC hosted a graduate student seminar where six students presented their research to a general public audience in Fort Collins. CHCC students included J. Brager, M. Morones, C. Purdy, and B. Windell.

DECEMBER | P. Tricorache was the featured speaker at a meeting in Nairobi, Kenya with enforcement officials from Djibouti, Ethiopia, Kenya, Somalia, United Arab Emirates, and Yemen. The meeting, titled "Regional investigative and analytical case meeting on the smuggling of cheetahs," was organized by INTERPOL and funded by the European Union in support of the International Consortium on Combatting Wildlife Crime (ICWC). This is part of a multi-year effort to encourage collaboration among enforcement bodies, governments, international organizations, and researchers in the fight against cheetah trafficking.

CHCC AND THE MEDIA

Media coverage of our research and education efforts has been extensive. The office of University Communications at CSU conducted an analysis of earned media coverage of human-carnivore coexistence featuring CSU in 2024. The search reported 270 media mentions from January 1 – December 31, 2024, with a potential reach of 1.09 billion readers, viewers, and listeners and an advertising value equivalency of \$10 million.

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equivalency.



SELECT MEDIA COVERAGE

Booster, S. January 11, 2024. Wolves and recreation in Colorado: Should you be worried? [The Gazette](#).

Blumhardt, M. January 18, 2024. Polarizing predator: Separating facts from fiction to answer common questions about wolves. [Fort Collins Coloradoan](#).

Matuska, W. January 18, 2024. Rewilding the West. [Boulder Weekly](#).

Goldfarb, B. February 1, 2024. Can coexistence with wolves be bought? [High Country News](#).

Roy, A. February 15, 2024. Wolves won't wait. [Backpacker Magazine](#).

Horvath, A. March 7, 2024. Wolf myth-busting with wildlife biologist Kevin Crooks. [Rocky Mountain PBS](#).

Anthes, E. March 18, 2024. Where the wild things went during the pandemic. [The New York Times](#).

DuBose, E. May 7, 2024. Boebert's bill to remove protections from gray wolf passes House. [The Durango Herald](#).

Crooks, K. & Gonzalez, M. April 29, 2024. CSU students propose transdisciplinary solutions for human-carnivore coexistence. [CSU SOURCE](#).

Butzer, S. June 13, 2024. 'It works': Colorado's wolf conflict coordinator, ranchers find common ground protecting livestock from wolves. [Denver 7](#).

Ditmer, M. June 13, 2024. If you go in the woods today.... [Canadian Broadcasting Corporation](#).

Kachur, T. June 13, 2024. If you go out in the woods today.... [CBC News](#).

Ditmer, M. June 26, 2024. We're polluting our forests—with noise. Nautilus Magazine.

Ditmer, M. June 22, 2024. Hiking, biking causes elk, bears to flee. [Jackson Hole News and Guide](#).

Ditmer, M. July 9, 2024. Hikers scare off wildlife, Boise researchers found. The impact may be bigger than you think. [The Idaho Statesman](#).

Ditmer, M. July 5, 2024. The hills are alive with the sound of recreation – and a study shows animals react to that noise. [NPR News, KUNC](#).

Yovovich, V. July 23, 2024. Wildlife sleuths use DNA to understand deadly pet attacks in Santa Cruz mountains. [The Mercury News](#).

Ortiz, A. August 29, 2024. Colorado to relocate gray wolves after reports of livestock attacks. [New York Times](#).

DeLoss, J. August 30, 2024. Survey reveals Colorado views on hunting mountain lions, black bears. [CSU Source](#).

Crooks, K & Niemiec, R. September 13, 2024. Colorado voters weigh a ban on hunting mountain lions as attitudes toward wild predators shift. [The Conversation](#).

Crooks, K & Niemiec, R. September 13, 2024. Analysis: Colorado voters weigh a ban on hunting mountain lions as attitudes toward wild predators shift. [Westword](#).

Meyer, C. September 18, 2024. Your guide to the 14 questions on Colorado's ballot. [5280](#).

Whitney, E. October 15, 2024. Neighborhoods in Boulder aim to harvest fruit trees before bears have a go at it. [NPR](#).

Crooks, K. October 31, 2024. The Colorado Experience: Return of the Wolf. [Rocky Mountain PBS](#).
Gonzalez, M. October 31, 2024. This American Land: Gray Wolves. [Rocky Mountain PBS](#).

Schmelzer, E. November 2, 2024. How much has Colorado's wolf reintroduction cost? [The Denver Post](#).

Blumhardt, M. November 6, 2024. Colorado will still allow mountain lion hunting after voters reject Proposition 127. [Coloradoan](#).

Boyce, D. November 8, 2024. Opponents and supporters say wolves were on voters' minds when they rejected big cat hunting ban. [Colorado Public Radio](#).

Collins, D. November 8, 2024. The return of wolves to Colorado will change elk hunting. Here's how. [Outdoor Life](#).

Longwell, A. November 9, 2024. Colorado Parks and Wildlife meets with four counties to shares its plan on next wave of releases. [Summit Daily](#).

Blumhardt, M. November 15, 2024. Wildlife officials narrow 2025 wolf release sites to three counties. [Coloradoan](#).

Guerrero, C. November 15, 2024. Celebrating a conservation legacy: A 75th Anniversary Tribute to Aldo Leopold's Sand County Almanac. [CSU Source](#).

Hitt, J. December 2, 2024. Outcomes from Year 1 Transdisciplinary Grants. [CSU Source](#).

Jenkins, D. December 13, 2024. Washington range-riding programs lauded in report. [Capital Press](#).

Butzer, S. December 18, 2024. Colorado began reintroducing wolves 1 year ago. These are the struggles and triumphs of that year. [Denver 7](#).

CHCC 2025 GOALS



RESEARCH

Enhance transdisciplinary research on human-carnivore coexistence by strengthening collaborations across disciplines and academic units within CSU.

Develop and test new technologies and livestock management strategies for reducing human-carnivore conflict, including continued collaboration with ranchers in Oregon and Idaho.

Investigate social outcomes of stakeholder and public engagement, including social conflict, social learning, trust, and acceptability of management options regarding human-carnivore coexistence.

Investigate the behavior and ecology of large carnivores in relation to conflict and coexistence with people.

EDUCATION

Mentor postdoctoral fellows and graduate students on the social-ecological science related to human-carnivore coexistence.

Support graduate students via CHCC Student Research and Outreach Mini-Grants.

Engage undergraduate students in human-carnivore coexistence research and outreach, including via coursework and Undergraduate Research Experience.



OUTREACH

Advance partnership with CSU Extension to continue community-based outreach regarding conflict reduction with wolves and other carnivores in Colorado.

Implement technology and tools for reducing human-carnivore conflict, including in partnership with CSU's Rapid Prototyping Lab.

Facilitate peer-to-peer learning and knowledge transfer among livestock producers regarding sustainable ranching in landscape with predators.

Disseminate social and ecological science related to human-carnivore coexistence to the general public, practitioners, and policy makers.

Develop events that bring diverse stakeholders together and elevate voices of traditionally marginalized groups to promote human-carnivore coexistence.

FINANCIAL

Pursue goal of ensuring long-term financial sustainability of the Center for Human-Carnivore Coexistence, including securing endowed funds.





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JOIN US!

Join us in building a new era for human–carnivore coexistence, ensuring that humans and carnivores can live together with fewer impacts to both people and predators.

For more information, visit:

sites.warnercnr.colostate.edu/centerforhumancarnivorecoexistence/



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